STATE OF ILLINOIS

ILLINOIS COMMERCE COMMISSION

COMMONWEALTH EDISON COMPANY, Approval of the Energy Efficiency and Demand-Response Plan Pursuant to Section 12-103(f) of the Public Utilities Act	)))))	Docket No. 07-0540

Corrected Direct Testimony of

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On Behalf of Commonwealth Edison Company

November 15, 2007

ComEd Ex. 6.0 Corrected

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I. Introduction and Purpose

A. Identification of Witness

Q. Please state your name and business address.

A. Val R. Jensen, ICF International ("ICF"), 394 Pacific Avenue, San Francisco, California 94111.

Q. By whom are you employed and in what capacity?

A. I am a Senior Vice President with ICF International, a management, technology and policy consulting firm.

B. Purposes of Testimony

Q. What are the purposes of your direct testimony?

A. The purposes of my direct testimony are to:

(1) Describe how the energy efficiency measures, program elements and programs set forth in the energy efficiency portfolio submitted by Commonwealth Edison Company ("ComEd") were identified.

(2) Show that ComEd's proposed portfolio of energy efficiency programs, when considered in conjunction with the Department of Commerce and Economic Opportunity's ("DCEO") portfolio of such programs, is designed to achieve the goals set forth in Section 12-103(b) of the Public Utilities Act ("Act").

(3) Demonstrate that the proposed individual energy efficiency measures, program elements, and programs, the proposed demand response programs, the proposed energy efficiency and demand response portfolio, and the programs proposed in DCEO's portfolio are all cost-effective under the Illinois total resource cost ("TRC") test.

(4) Propose values for measure savings and net-to-gross ratios to be adopted by the Illinois Commerce Commission ("ICC" or "Commission") and used in ComEd's evaluation, measurement and verification ("EM&V") process.

(5) Demonstrate that ComEd's 2008-2010 Energy Efficiency and Demand Response Plan ("Plan") is designed to fall within the spending screens described in Section 12-103(d) of the Act.

(6) Show that the overall portfolio of energy efficiency and demand response measures, when considered in conjunction with DCEO's portfolio of such measures, represents a diverse cross-section of opportunities for customers of all rate classes to participate in the programs.

C. <u>**Summary of Conclusions**</u>

Q. Please summarize the conclusions of your direct testimony.

A. I have concluded the following. First, based on a broad assessment of energy efficiency measures and programs, including a review of the experience of utilities in other states in implementing similar programs and a review of the measures proposed by DCEO, the portfolio of energy efficiency programs proposed by ComEd is designed to achieve the savings goals set forth in Section 12-103(b) of the Act. Second, based on my analysis, the energy efficiency programs, demand response program, and ComEd's portfolio as a whole, in conjunction with DCEO's programs, satisfy the TRC test. Third, the Commission should "deem" the measure savings and net-to-gross ratio values proposed in Section IV of my testimony, and find that it is reasonable both for ComEd to have used these values in preparing its Plan and for an independent evaluator to use these values when calculating the actual savings associated with certain programs in ComEd's Plan.

Fourth, ComEd's Plan is designed to fall within the spending screens described in Section 12-103(d) of the Act. Finally, ComEd's Plan offers a variety of options for customers from all rate classes to participate in energy efficiency and demand response programs.

D. Identification of Exhibits

Q. What attachments are attached to and incorporated in your direct testimony?

A. I have attached the following exhibits to my testimony:

ComEd Ex. 5.1: Curriculum vitae of Val Jensen.

E. Background and Experience

Q. Please summarize your duties and responsibilities in your current position.

A. My principal focus at ICF International is the analysis, design and implementation of energy conservation programs.

Q. Please summarize your educational background and professional experience.

A. I received a B.A. in Political Science from Hamline University in St. Paul, Minnesota and an M.A. in Public Affairs from the Humphrey Institute at the University of Minnesota where I specialized in Energy Policy and Quantitative Methods.

Prior to rejoining ICF International in 2000, I was Director of the Chicago Regional Office for the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy. In that position I was responsible for the administration of all of the Department's energy efficiency and renewable energy deployment programs for the Midwest. Prior to assuming that position, I was a member of the senior staff of the Assistant Secretary for Energy Efficiency and Renewable Energy at the Department of Energy in Washington, D.C., with responsibility for assessing policies and programs at the state and federal levels affecting investment in energy efficiency and renewable energy in a restructuring utility market. I also directed the Department's Integrated Resource Planning Program.

Before joining the Department of Energy, I spent several years consulting to the U.S. Environmental Protection Agency and a variety of private utility clients with respect to development and implementation of energy conservation programs. I also spent eleven years working for the Illinois Department of Energy and Natural Resources, performing and directing analyses of energy policy and energy conservation programs. For approximately six of those years, I directed the design and development of statewide integrated utility resource plans then required by Illinois law. These plans included assessment of energy conservation potential, and were subject to review and approval by the Commission. I have testified before the Commission and the Public Service Commission of Wisconsin, as well as before legislative committees in Illinois and Wisconsin. A copy of my current cirriculum vitae is attached as ComEd Exhibit 5.1.

II. <u>Development of a Cost-Effective Energy Efficiency Portfolio</u>

Q. What was ICF's role in assisting ComEd in the development of its Plan?

A. ICF was retained by ComEd to provide support in the development of the Plan, including the cost-effectiveness analysis of ComEd's and DCEO's energy efficiency and demand response measures and programs, and the development of initial program designs. In addition, we were asked to support ComEd in the final development and analysis of the entire portfolio. At ComEd's request, ICF provided an initial list of energy efficiency measures that could be considered in the analysis. ComEd reviewed this list and made a number of suggestions for additional measures. We then collected additional data for each measure. I describe this process in greater detail below. As part of this data collection process, it is typical to prepare building energy simulations to estimate the energy savings associated with energy efficiency measures, where those savings are affected by temperature. A given measure, such as an air conditioner, also depends on the type of building it is used in, and so we typically prepare these building energy simulations for a range of generic building types that reflect the building stock within a utility's territory. ComEd reviewed the building types we suggested, proposed changes to these types and reviewed the characteristics of the buildings that are needed to run the simulations. Based on the measure data that we collected or produced using building simulation, we prepared the analysis of measure cost-effectiveness described below. ComEd reviewed the results of this in detail and helped refine inputs and calculations.

With respect to the other elements of the process described below, ICF generally undertook each step and then reviewed the results in detail with ComEd. In particular, we worked closely with ComEd in the process of bundling measures into programs and designing the basic elements of each program. ComEd made final decisions with respect to program design, including general incentive levels, program implementation costs and participation rates based on an iterative process of program data refinement and cost-effectiveness analysis.

A. Selection of Energy Efficiency Measures

1. Identification of Potential Energy Efficiency Measures

Q. What is an energy efficiency measure?

A. An energy efficiency measure is a device, appliance or practice which, when installed in a home, business or manufacturing process, results in a reduction in the amount of energy used per unit of useful service. A compact fluorescent light bulb ("CFL") is a common example of an efficiency measure when it is used to replace a standard incandescent light bulb.

Q. How does a "measure" differ from the "program elements" to which you refer above?

A. A "program element" represents a combination of one or more energy efficiency or demand response measures with a set of incentives or other services and a process for recruiting customers to install or implement the energy efficiency or demand response measures. One simple example of a program element is a commercial and industrial prescriptive incentive program, wherein a utility provides fixed incentives for a wide variety of standard commercial and industrial energy efficiency measures. Within such a program element structure, the utility often will work with trade allies such as lighting or heating, ventilation and air conditioning ("HVAC") contractors to recruit customers who would benefit from installing these measures.

Q. How did ICF select the energy efficiency measures for the initial list?

A. The broad list of energy efficiency measures that might be considered for adoption by consumers in the ComEd service territory was compiled from several sources, the principal of which was the Database for Energy Efficiency Resources ("DEER") maintained by the California Energy Commission. This database contains several thousand measures that could be applied in residential, commercial and industrial buildings. For each measure, the database provides an estimate of the energy savings per unit, as well as the costs associated with installation of the measures. All utilities in California use this database as the primary source of measure information in the design and evaluation of energy efficiency programs in that state, and utilities and state agencies in other states also rely on DEER. Other sources of information for the measure list included the Consortium for Energy Efficiency, the American Council for an Energy Efficient Economy ("ACEEE"), and the Regional Technical Forum database maintained by the Northwest Power and Conservation Council. The Consortium for Energy Efficiency is a not-for-profit organization funded by utilities and the federal government to develop various initiatives to promote energy efficiency measures. ACEEE is also a not-for-profit organization that has promoted policies favoring energy efficiency for several decades. ACEEE publishes a variety of research reports pertaining to energy efficiency technologies, potential and program best practices. The Regional Technical Forum is an advisory group formed under the Northwest Power and Conservation Council to develop standards to verify and evaluate conservation savings.

The final database prepared for this analysis included slightly over 1,900 measures. It is worth noting that many of these measures are combinations or variations of basic measures, such as different wattages of CFLs or different configurations of what are known as T8 linear fluorescent lamps, and a number of specific measures were analyzed for multiple building types. About 200 of these measures are found in the residential sector, 900 are commercial measures and 700 are industrial measures.

Q. Please explain why the DEER database, a California database of energy efficiency measures, is applicable to Illinois.

A. While the DEER database is a database constructed and maintained in California, many of the measures have equal applicability to any jurisdiction. The database contains two basic types of measures. First, there are weather-sensitive measures. These are measures for which savings impacts are sensitive to local weather conditions. While we used the

DEER database as a source for basic weather-sensitive measure definitions, we developed independent estimates of measure savings based on data collected from several weather stations in the Chicago area. Second, there are non-weather-sensitive measures – measures for which energy savings are largely independent of weather. Industrial motors and many lighting measures are examples. In this case, measure savings from California are just as good as those from any other location, provided the methods for determining unit savings are valid and robust. In such instances, the DEER database is preferred, as it is based on many years of program impact evaluations, continually reviewed by developers and users, and updated frequently.

Q. Did your list of measures include all possible energy efficiency measures?

A. No. Even though our initial list included close to 2,000 measures, the list of all possible measures would be several times as large. A list of all possible measures would require that we look at every device or system that uses electricity in every possible building type, with every possible heating and cooling system. It is standard practice when conducting a first-stage measure screening to restrict analysis to those measures within a set of common building types that could account for the majority of energy efficiency potential in a given area. The goal of the measure screening process is to create the building blocks for energy efficiency programs. These programs should be designed such that if additional measures are considered important to include, they can easily be screened and included within the program without major redesign. I consider the list of measures examined to have been comprehensive.

2. **Analysis of Cost-Effectiveness of Measures**

Q. How did you determine which energy efficiency measures should be included within ComEd's energy efficiency portfolio?

A. Section 12-103(b) of the Act requires that the energy efficiency measures used in the portfolio be "cost-effective," which is defined as having satisfied the Illinois TRC test. The standard TRC test was originally developed by the California Energy Commission in the 1980s as part of what is called the California Standard Practice Manual. Virtually every jurisdiction uses some form of this test for energy efficiency analysis. Illinois defines the TRC test as follows:

> "Total resource cost test" or "TRC test" means a standard that is met if, for an investment in energy efficiency or demand-response measures, the benefit-cost ratio is greater than one. The benefit-cost ratio is the ratio of the net present value of the total benefits of the program to the net present value of the total costs as calculated over the lifetime of the measures. A total resource cost test compares the sum of avoided electric utility costs, representing the benefits that accrue to the system and the participant in the delivery of those efficiency measures, to the sum of all incremental costs of end-use measures that are implemented due to the program (including both utility and participant contributions), plus costs to administer, deliver, and evaluate each demand-side program, to quantify the net savings obtained by substituting the demand-side program for supply resources. In calculating avoided costs of power and energy that an electric utility would otherwise have had to acquire, reasonable estimates shall be included of financial costs likely to be imposed by future regulations and legislation on emissions of greenhouse gases.

Section 1-70 of P.A. 94-0481 (Illinois Power Agency Act).

Q. Please summarize the Illinois TRC test in your own words.

A. In basic terms, the TRC test compares the benefits realized by installing a measure with the costs to install that measure. Benefits are calculated as the product of the measure's estimated energy and peak demand savings and the utility's avoided cost. Costs are equal to the incremental capital, installation and operating and maintenance ("O&M") costs. The incremental cost is defined as the difference between the cost of the efficiency measure and the cost of the measure that otherwise would have been installed. To illustrate this last concept, consider the following situation. A consumer has decided that her existing refrigerator no longer functions properly and that a new refrigerator is needed. She has a number of options for the new refrigerator, including a basic model that meets federal energy efficiency standards and a more expensive model that is more energy efficient. The incremental cost is the difference between the basic refrigerator and the higher efficiency model.

Before applying the TRC test to the individual energy efficiency measures we identified, we first had to gather additional data and perform further analyses related to these measures.

Q. Please explain your additional data collection efforts and analyses.

A. <u>First</u>, we divided the measures that we examined into two major classes: those with energy and peak demand savings that are not affected by temperature and those for which savings are weather-dependent. The former class includes measures such as lighting, household appliances, motors, and many industrial processes. The latter class includes measures such as air conditioning and building shell improvements (insulation). For example, an air conditioner will run for more hours and consume more electricity over the course of a summer in St. Louis than it will in Chicago because the St. Louis summers are generally warmer and more humid. An air conditioning efficiency measure will, therefore, save more energy when it is applied in St. Louis as opposed to Chicago.

The savings and cost data associated with non-weather-sensitive measures were taken in most cases from the DEER database. These measure data are frequently updated and are consistent in terms of cost basis. In several cases, we supplanted DEER measure cost with more recent local data. For example, the costs used for replacement room air conditioners were based on prices recently quoted online by Sears and Wal-Mart, and therefore were readily verifiable. The costs for CFLs in the residential sector were based on data collected by the Midwest Energy Efficiency Alliance as part of last year's Change-a-Light campaign.

In the case of weather-sensitive measures, we developed independent estimates of measure savings using building energy simulation. We employed the DOE-2 model, a building energy simulation model originally developed with Department of Energy funding that is now in the public domain. The DOE-2 model is the industry standard for simulating the hour-by-hour energy use of a building and its component systems. Separate estimates of measure savings for a wide range of measures were developed by simulating the operation of 12 prototypical commercial building types and three prototypical residential housing types in ComEd's territory. These simulations were prepared using weather data from several weather stations in the ComEd territory. In the case of the residential weather-sensitive measures, we modeled a detached single-family residence, an attached single family residence and a multi-family residence, all of which were heated with natural gas given the very high saturation of gas heat in the ComEd territory. Several HVAC types were also modeled for the commercial building types. The building and HVAC types that were modeled are presented in Table 1:

Table 1: Building & HVAC Types Used in DOE-2 Model

Building Type	HVAC Types
Office-Large	Chiller and Boiler
Warehouse	Packaged Gas and AC
Education	Chiller and Boiler
Retail - Large	Packaged Gas and AC
Retail - Small	Packaged Gas and AC
Office-Small	Packaged Gas and AC
Assembly	Packaged Gas and AC
Food Sales	Packaged Gas and AC
Food Service	Packaged Gas and AC
Lodging - Hotel	Chiller and Boiler
Lodging - Motel	PTH
Health Care	Chiller and Boiler

Second, in addition to collecting energy and demand savings data for the measures, the analysis requires estimates of the useful life of each measure. Measure lifetime is needed because the TRC test analysis needs to account for all of the energy savings realized by implementation of a measure over time. For example, installing a CFL generates savings relative to an incandescent bulb for a number of years, depending on how many hours per year the bulb is used.

Third, the cost-effectiveness analysis requires a discount rate that is used to estimate the present value of the efficiency measure's costs and benefits.

Q. How did you calculate the energy savings value(s) under the TRC test?

A. In order to properly value energy savings, we developed an appropriate hourly disaggregation of measure energy savings. The utility's avoided costs typically can vary by hour and will be significantly higher during certain times of the year and hours than others. If we were to use a simple average annual value for the utility's avoided costs in our calculation of the benefits of the energy efficiency measure, we would underestimate the value of savings during high-cost hours of the year and overestimate the value during low-cost hours.

The avoided energy and capacity costs that we used for the analysis were based on a forecast of wholesale energy prices for 36 groups of hours per year (peak, off-peak and wrap periods for each month in the year) for a 20-year forecast period. As described in the direct testimony of Frank S. Huntowski (ComEd Ex. 8.0), the forecast includes value for CO_2 based on the price cap in the Bingaman-Specter Bill (Low Carbon Economy Act), which established a national carbon program as of 2012. The CO_2 price cap starts at $12/tonne in 2012, and increases at 5% plus inflation annually thereafter. The impact of CO_2 on the electric price is a function of marginal price-setting generation in the PJM Interconnection, L.L.C. ("PJM") ComEd Zone. Avoided capacity costs were provided as annual values per kilowatt ("kW") for the forecast horizon. Measure energy savings therefore needed to be grouped into the same 36 "buckets" of hours to enable us to multiply avoided cost by energy and peak savings to yield an estimate of the annual benefit from installing a particular measure.

Because the DEER database provides estimates of annual energy savings and peak demand reductions, we needed to convert these annual values into 36 values that matched the avoided cost periods. This involved a two-step process. First, we used normalized load shapes for non-weather-sensitive measures to split an estimate of annual energy savings into estimates of hourly savings. The load shapes were developed by and purchased from Itron, a meter manufacturing, software and consulting firm heavily involved in the industry. The Itron load shapes represent the fraction of total annual energy represented by each hour for each end use in each sector. Second, once we had estimated hourly energy savings and demand reductions, we aggregated these to match the 36 avoided cost periods.

The process was different for weather-sensitive measures. Because we used the DOE-2 simulation model to develop hourly estimates of energy savings, we did not need to go through the first step noted above. We moved directly to the second step with the weather-sensitive results and aggregated the DOE-2 hourly outputs into the 36 periods.

Q. Please describe how you applied the TRC test to the individual measures.

A. Using the data described above, we calculated the value of the TRC test for each of the measures in the database. Measures that score a ratio of benefits to costs of 1.0 or greater are considered to pass the TRC test. In general terms, the TRC test compares benefits (avoided costs * energy and demand savings) and costs (incremental capital, installation and O&M costs of measures + utility implementation and administrative costs). The formal expression of the Illinois TRC test, which differs from the standard formulation of the TRC test, is as follows:

TRC = Benefits/Costs

$$BTRC = \sum_{t=1}^{N} \frac{UAC_t}{(1+d)^{t-1}}$$

$$CTRC = \sum_{t=1}^{N} \frac{PRC_t + PCN_t + UIC_t}{(1+d)^{t-1}}$$

Where:

$BTRC$ = Benefits of the program

$CTRC$ = Costs of the program

UAC_t = Utility avoided supply costs in year t

UIC_t = Utility increased supply costs in year t

PRC_t = Program Administrator (Utility) program costs in year t

PCN_t = Net Participant Costs in year t

The TRC test often is applied to assess the cost-effectiveness of individual energy efficiency measures as well as energy efficiency programs. When the analysis of measures is prepared, we look at a single measure's costs and benefits and do not include variables such as Program Administrator program costs because, at this stage in the analysis, there are no program costs.

Q. Does your calculation of cost-effectiveness incorporate both electricity savings and demand reductions?

A. Yes, this is very important. Most energy efficiency measures not only reduce the total amount of electricity consumed over the course of a year, but also reduce peak demand. Some measures, like a central air conditioning tune-up, have a greater impact on peak demand than installation of a residential CFL, because the CFL most likely is not on during the summer peak period. When we calculate the cost-effectiveness of a measure, we both: (i) multiply energy savings by the avoided energy cost and (ii) multiply peak demand savings by avoided capacity costs. Because avoided costs can vary substantially by time of day and time of year, these costs are time-differentiated to ensure that we capture the proper value of energy and peak demand reductions over the course of a year.

Q. How does the Illinois version of the TRC test differ from standard formulations of the test?

A. There are two main differences. First, the standard formulation (the version included in the California Standard Practice Manual) includes the value of tax credits in calculating the benefits of an efficiency measure. Second, and most important, the standard formulation includes the value of all energy savings attributable to a measure, while the Illinois version includes only the value of electricity savings and excludes natural gas savings.

Q. Is this latter difference significant?

A. Yes. The importance can best be explained using an example. Some energy efficiency measures produce both electricity and natural gas savings. For example, adding insulation to a house will reduce both the electricity used for cooling and the natural gas used for heating. Similarly, insulating a home's ductwork or sealing duct leaks saves both gas and electricity. The Illinois TRC test, at least as it has been interpreted, excludes gas savings, which can be significant in a northern climate like that of ComEd's service area. Measures such as those described above are assessed strictly on the basis of their electricity savings, and it is often the case that these savings alone will not exceed the cost of the measure. As a result, such measures do not screen as cost-effective, and the number of measures that can be included in programs is reduced.

This effect is most pronounced in the case of programs that are intended to address the house-as-a-system and provide comprehensive sets of measures to improve overall home performance. The limitation on the type of savings included in the Illinois TRC test required us to restrict the Home Energy Performance program to the very small number of all-electric homes. It also required us to abandon a comprehensive new home construction program and instead focus on improving the lighting package in new homes.

For example, the TRC benefit-cost ratio for a comprehensive home performance program targeting all ComEd homes was 0.15 when gas savings benefits were excluded, but 1.16 when gas benefits were included. An ENERGY STAR New Homes program had a TRC benefit-cost ratio of 0.57 when gas benefits were excluded, but 2.2 when gas benefits were included. However, despite the exclusion of gas savings, there are still plenty of measures available to ComEd for a robust long-term energy efficiency portfolio.

Q. Please describe the results of the TRC test on the individual energy efficiency measures.

A. The results of the measure screening are presented in Tables 2 and 3 below. Of the roughly 1,900 measures that were screened, approximately 1,300 passed with a benefit-cost ratio of 1.0 or greater. Table 2 shows the numbers of measures passing the TRC test for each sector and illustrates the number of any additional measures that would pass the TRC test if natural gas savings were included. Table 3 describes the measure types that passed the Illinois TRC test. A measure type encompasses a number of specific measure configurations. For example, the Commercial T8 Lighting measure includes a variety of light fixture configurations within the 10 commercial building types that were included in the analysis. These measures are subsequently bundled into program "types."

Table 2. Number of Measures Passing the TRC Test

	Total Number of Measures Screened	Measures with TRC >1.0 excluding gas savings (Illinois TRC Test)	Measures with TRC > 1.0 including gas savings (Standard TRC Test)
Residential	257	90	116
Commercial	942	692	726
Industrial	728	527	527
Totals	1927	1309	1369

Table 3. Types of Measures Passing the TRC Test

Residential Measures	Commercial Measures	Industrial Measures
Compact Fluorescent Light Bulbs (screw-ins) and Table Lamps Energy Star Dishwashers Second Refrigerator Pick-Up and Recycling Central AC Refrigerant Charge Domestic Hot Water Wrap New Room AC New Central AC SEER13-SEER14 Hot Water Pipe Insulation Low-Flow Showerheads Advanced Lighting Package for New Construction	T12 to T8 Linear Fluorescent Lamps (various combinations) Compact Fluorescent Lamps (screw-ins) LED Exit Signs LED Traffic and Pedestrian Signals Computer Power Management Variable Speed Drives and Temperature Control for Chilled Water and Hot Water Loops Air Handler Coil Cleaning New Packaged Air Conditioning Units Efficient Chillers Variable Air Volume Retrofits Commercial Refrigeration Controls and Equipment Upgrades New Construction	Compressed Air Improvements (controls, optimization, VSD installations) Fan Improvements Pump Improvements Process Heating Refrigeration Machine Drive T12 to T8 Linear Fluorescent Lamps (various combinations) Various Sector-Specific Process Improvements

B. Development of Energy Efficiency Programs

1. Bundling of Measures Into Program Elements and Programs

Q. Please explain the process of bundling measures into program elements.

A. A program element is a general classification that references the types of measures that might be offered within a program targeted at a specific market. For example, we might bundle all residential lighting and appliance measures passing the TRC test into a Lighting and Appliances program element. The bundling process is used because very few, if any, program elements and programs are designed and implemented that include only one single measure. Rather, program designers build programs around combinations of measures that might appeal to a given market and that can be delivered using similar channels. The bundling process also is necessary because in subsequent steps, we estimate how many of each measure would or could be adopted by program participants and then sum the energy and demand reduction impacts of these measures. All of the specific program elements and programs that we used are described in more detail in the direct testimony of Michael S. Brandt (ComEd Ex. 2.0).

Appendix B to the ComEd Plan (ComEd Ex. 1.0) includes a set of tables showing each measure and the program type to which it was assigned. Note that not all measures assigned to a program ultimately were included in the program because not all were cost-effective.

Q. How did you approach the process of program design?

A. The program elements and programs that we used were based on an ongoing review of best practice program design and implementation for companies similarly situated to ComEd.

Q. Please describe "best practice" program design and implementation.

A. Energy efficiency program "best practice" involves the application of a number of considerations, as well as experience, to each individual case. Considering the degree to which regulatory environments differ from state to state, there simply is too much variability across objectives, regulatory structures and program types to enable simple, broad conclusions about what is best in every case. Best practices should be viewed partly as a function of the experience of the program administrator and implementer. For example, best practices for a utility that has been designing and managing programs for two decades may be different from best practices for an organization just entering the field.

Various organizations have, however, reviewed and compiled best practices in the area of energy efficiency. My reference to an ongoing review of best practice design and implementation refers to my review of a number of well-respected assessments of program best practice, including ACEEE's compendium of Exemplary Programs[1] and reviews of program best practice sponsored by the California Public Utilities Commission ("CPUC")[2] and the Energy Trust of Oregon[3]. It also is based on a review of the types of programs implemented by utilities often considered to be leaders in the field, such as Xcel Energy, Northeast Utilities, Pacific Gas & Electric ("PG&E") and the Wisconsin Focus on Energy program. Finally, we solicited the input of national experts in this area during a meeting of Illinois stakeholders in Lombard, Illinois on September 13, 2007. Based on my review of these sources and my experience in working with a number of utilities, best practice design generally includes the following considerations:

1. Programs should focus on technologies and market segments with relatively large untapped potential. Program designs that offer prescriptive rebates for common technologies across the entire commercial and industrial ("C&I") market are relatively simple to design and administer, and are very effective

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[1] Accessible at http://www.aceee.org/utility/exemplary_programs/index.htm

[2] Accessible at http://www.eebestpractices.com/index.asp

[3] Accessible at
http://www.energytrust.org/library/reports/Best_Practices/index.html?link_programs_reports_lin1Page=3

in tapping into large veins of efficiency potential in lighting, motors and HVAC systems.

2. Programs should leverage existing branding and delivery structures. For example, residential lighting, appliance, and new homes programs built around the ENERGY STAR brand can leverage the market awareness the brand enjoys.[4]

3. Programs should employ simple, straightforward program design. The more complex the design, the more difficult the implementation and administration of the program, and the greater the level of organizational capacity required to manage the program. For example, prescriptive rebate programs that employ deemed savings values and standard rebate amounts for common technologies are basic building blocks of virtually every utility program portfolio. Resource acquisition programs tend to be more straightforward and cost-effective than market transformation programs. The cost-effectiveness advantage is due primarily to the fact that the energy savings attributable to market transformation programs are often difficult to determine.

4. Incentives should be targeted at the point in the product value chain that yields the greatest leverage. For example, aiming ComEd's incentives at large appliance retailers or manufacturers and having those entities provide the incentives to consumers would enable ComEd to achieve greater scale

[4] In fact, one major evolution in practice has been the migration away from utility branded new homes programs to ENERGY STAR-based programs that can take advantage of the valuable stock of collateral and the consistency in design standards.

faster and minimizes the resources ComEd would have to deploy. Similarly, using residential HVAC distributors as the delivery vehicle for an air conditioning incentive program takes advantage of the distributors' existing networks and natural incentives to "sell-up."

5. Large customers can be most effectively tapped with custom incentive programs. These programs provide rebates for groups of measures based on calculated savings and have proved to be very effective at generating low cost (to the utility) savings. These programs also provide utility customer account managers with valuable tools for enhancing customer value. The design of these programs is straightforward, with the utility providing an incentive threshold against which customers can design projects.

6. Effective programs require close coordination of marketing, technical support and incentives. In most companies this requires an effective internal structure for working across multiple organizations within the firm.

7. Effective portfolios represent a mix of education/consumer outreach, technical support and training, and incentive elements, each of which is structured to work with the others.

8. With the commoditization of many types of program services, it is possible for a utility to develop and manage effective programs with significantly fewer internal resources than was the case a decade ago. It is possible and cost-effective to outsource most program implementation services.

9. When working with upstream market participants such as national retailers or manufacturers, programs will be more effective if they employ structures

with which these market participants are familiar. For example, if a retailer is used to working with a point-of-sale rebate, it will be most efficient to design a new program around this preference.

10. While there are exceptions, the most important of which is noted below, most best practice programs have staying power. They become best practice because their sponsors have time to refine both design and implementation. Participation rates climb as program availability becomes known through market networks, and all points in the market chain have time to align with the program.

11. Finally, my point above notwithstanding, best practice, both in program design and in implementation, looks forward. Even though the immediate focus of a portfolio might be on achieving certain near-term targets, success ultimately is in transforming the market such that consumers make efficient decisions without direct financial incentives. Therefore, best practice requires us to look ahead to identify opportunities to move out of some program markets and into others to ensure program resources are efficiently allocated.

2. <u>Program Design</u>

Q. Please explain the process of how programs are built.

A. Program designers transform the general program types listed in Appendix B to the Plan into more detailed program designs and then assemble the data needed to assess program cost-effectiveness. The more detailed program design is based on a program logic model that describes how a particular method of delivering the measures, including proposed incentives, recruiting, marketing and implementation strategies, will motivate customers to acquire, install and use the efficiency measures.

For example, consider a residential lighting program. A detailed program design in this area would outline the designers' understanding, based on their own and others' experience and available market research, of the specific combination of incentives, delivery mechanisms and marketing that will encourage customers to install CFLs. There are very different ways to accomplish this result, each of which has a different cost and likelihood of success. For example, ComEd could directly install the bulbs. This would ensure that the bulbs are in fact installed, but at a significant cost per bulb. On the other hand, ComEd could work with CFL manufacturers to provide discounts on CFLs that are flowed through to the retail price. This "upstream" incentive is used in combination with cooperative advertising with retailers to encourage consumers to purchase the bulbs at the discounted price and screw them in themselves. This program structure is much less expensive, but would likely have a lower installation rate, and in any case installation rates would be difficult to track for evaluation purposes.

This logic model behind program design informs the estimation of key program-level data. These data include the level of incentive per measure, the level of implementation, marketing and administrative costs per program, and the estimated level of program participation (the number of each measure that we expect to be installed). In most cases, the sources of these data are other utility programs that have a structure similar to the prospective program we are analyzing. As part of the analysis for ComEd, we collected data from either the plans or reported results for programs offered by PG&E, Southern California Edison, Northeast Utilities (Connecticut Light and Power and

United Illuminating), NSTAR, Efficiency Vermont, We Energies, Xcel Energy, Arizona Public Service, Nevada Power, NYSERDA, PacifiCorp and the New Jersey Utilities. We reviewed data for multiple programs from a number of these program administrators.

3. <u>Analysis of Cost-Effectiveness of Programs</u>

Q. How did you determine whether a program was itself cost-effective?

A. To determine cost-effectiveness at a program level, we reran the TRC test on the programs, rather than on the measures. There are three differences between the screening process for measures and programs. First, when screening measures, the PRC term (program administrator costs) in the Illinois TRC test set forth above is set to zero. However, program-level screening requires that the PRC term take a value equal to the sum of the cost to implement and administer the program.

Second, while the measure screening focused on the cost-effectiveness of a single measure, by definition we are interested here in the cost-effectiveness of a bundle of measures as these measures are adopted by program participants. This means that at the program level, we must also project the number of measures that we expect to be adopted as a result of the program.

The third difference is directly related to the second. Every customer that receives an incentive for undertaking a specific program-sponsored activity is a participant, but not every participant is motivated to undertake that activity by the program. Some fraction of program participants will be what is termed "free riders" – participants that would have undertaken the desired action even in the absence of the program. The estimated savings for a program must be reduced by the amount of savings attributed to these free riders. At the same time, however, there will be customers who undertake the action the program is attempting to motivate, but who do not actually take any incentive from the program. These customers are known as "free drivers" and the savings that their actions produce are termed "spillover". Just as the effects of free riders must be accounted for, so should the effects of free drivers.

The net effect of free-ridership and spillover is known as the net-to-gross ("NTG") ratio – the ratio of: (1) net program savings calculated as the net of free-ridership and spillover and (2) gross program savings, which are equal to the total number of measures installed and their associated savings. The NTG ratio is a number calculated based on post-implementation evaluation of program impacts. Using a series of questions posed to both program participants and program non-participants, evaluators attempt to determine which participants are free riders (*i.e.*, would have undertaken a program-sponsored action even without the program) and which non-participants are free drivers (*i.e.*, took action even though they did not avail themselves of the program incentives). Program designers use the results of prior NTG ratio analyses as inputs to program cost-effectiveness calculations.

Q. On what sources did you rely to compile the program cost, participation, and NTG ratio data?

A. The program cost data that were used in the analysis are based on the costs reported by utilities running similar programs in other parts of the country. These costs are reported in a variety of documents, including compendia of best practices, utility planning documents and evaluation reports. We did not use these cost data directly, but rather calculated relative cost measures such as implementation cost per unit of energy saved so that we could apply data from different sized utilities to ComEd. In my response to an earlier question, I listed the utilities and other program administrators that were the sources of program data. The values used in the ComEd portfolio ultimately were based on professional judgment, taking into account the experience of other utilities, the ComEd service territory and ComEd's level of experience related to specific programs.

The participation data also are based on the actual or projected achievements of similar programs as prepared by the utilities managing the programs. Again, the final values used to develop the portfolio are based on the collective review of these data by ICF and ComEd staff and the application of judgment. For key program elements, such as the Residential Lighting element, we calculated the number of CFLs that would need to be acquired given our participation assumptions and compared this number with similarly sized utilities such as Southern California Edison and PG&E. For programs that we expected would play a smaller role in the portfolio initially, the participation assumptions were largely judgment-based, where the judgment was informed by ICF's and ComEd's understanding of the relative size of the market for a given program. Participation rates were set to reflect our collective judgment as to levels of participation that could be achieved given the design of the programs and the fact that the programs were starting essentially from scratch. Participation was adjusted downward in several cases because, based on our analysis of program and portfolio risk, we concluded that the success of the portfolio was too dependent on the performance of a program. Lacking data on the size of specific program element markets and focused on designing a portfolio that would meet the savings goals, a primary concern on our part was avoiding over-estimates of program participation. The estimates of participation that we have used should be viewed not as targets or caps for any given program element, but as conservative estimates of market response.

The principal source of the NTG ratio estimates was the California Energy Efficiency Policy Manual as referenced in the DEER online database. This manual contains a table of reference NTG ratios.[5] Because NTG ratio values can be very important in the determination of program cost-effectiveness, we asked Nick Hall, President of TecMarket Works, to review the values we propose to use. (*See* direct testimony of Nicholas P. Hall, ComEd Ex. 7.0.)

Q. Please summarize the findings of your cost-effectiveness analysis.

A. Table 4 below shows the results of the program cost-effectiveness analysis:

Table 4: TRC Results for ComEd and DCEO Programs

Program Name	TRC
Single Family Home Performance	1.04
Residential AC Tuneup	1.17
Appliance Recycling Program	1.35
Residential Lighting	2.90
Residential Multifamily "All Electric" Sweep	1.33
Residential New HVAC	1.11
Residential Advanced Lighting	1.11
Nature First Expansion	1.05
C&I Prescriptive	1.25
C&I Retrocommissioning	1.11
Small C&I CFL Intro Kit	2.07
C&I Custom	2.10
C&I New Construction	1.06
DCEO Public Sector Prescriptive	1.16

[5] Available at http://eega.cpuc.ca.gov/deer/Ntg.asp

DCEO Public Sector Customized Program	2.92
DCEO Public Retro-commissioning	2.94
DCEO Lights for Learning	2.53
DCEO Low-Income New Const. Gut Rehab	0.55
DCEO Low-Income EE Moderate Rehab (MF)	0.35
DCEO Single Family Rehab	0.30
DCEO Low-Income Direct Install	0.60
DCEO Public Sector New Construction	4.30

C. <u>Design of Energy Efficiency & Demand Response Portfolio</u>

Q. Please describe how ComEd selected the energy efficiency programs for the portfolio.

A. Drawing from those programs that passed the TRC test, we worked with ComEd to build a portfolio that was designed to achieve the goals set forth in the statute subject to the spending screens outlined in Section 12-103(d) of the statute and that are explained in the direct testimony of Paul R. Crumrine (ComEd Ex. 5.0). In addition, we took into account other important considerations, such as how fast certain programs can be ramped up, the risk profiles of the programs (*i.e.*, the likelihood that actual savings will match expected savings) and the number of programs that can successfully be launched simultaneously. In short, designing a portfolio is not as simple as adding program impacts together.

Q. Please describe the portfolio design process in more detail.

A. The portfolio design step actually uses three distinct approaches to increase the likelihood of achieving the savings goals. First, given the spending screens noted above, we simulated a variety of different combinations of programs, start dates, ramp-up rates and participation rates to arrive at a phased combination of programs that would maximize savings under the statutory spending screens, but that also would yield program diversity, ensure that programs were available for all customer classes, and position the portfolio for the second planning/implementation cycle.

Second, we bundled what are described above as programs into several broad "solutions" offerings, which is consistent with best practice design and its approach of viewing program offerings from the perspective of the customer. If customers are faced with the variety of individual programs we described above, they would to sort out which program or programs will offer them the solutions they seek. This can easily lead to customer confusion and lower participation. In addition, operating a dozen program elements as though they were independent can lead to inefficiencies such as overlapping marketing, recruiting and delivery efforts. Finally, the separate implementation of all of the program elements can lead to missed opportunities to provide customers solutions that cut across multiple program elements. Therefore, we have worked with ComEd to bundle these individual programs as elements within two broad solutions programs – Residential Solutions and Business Solutions. Although these solutions-based programs will involve multiple incentive types and services, the intent is to market the programs as the equivalent of super-stores, with several easy-to-find portals that will provide access to a full range of services. For analysis purposes, it was necessary to treat these elements separately so that we could estimate measure costs and savings. However, as the Plan indicates, the portfolio will "go-to-market" as two broad programs. The programs presented in DCEO's portfolio cover additional market sectors not covered by ComEd's portfolio.

Third, we added a final layer of costs to represent cross-cutting portfolio administrative requirements such as evaluation and planning, as well as vital program elements that do not directly yield energy savings. These program elements include consumer information and education tools and initiatives, and technical assistance and training that would not otherwise fall under a specific energy-saving program.

Q. As part of your analysis of ComEd's portfolio as a whole, did you also assess the cost-effectiveness of demand response programs for ComEd?

A. Yes. In the case of demand response programs, ComEd provided us with all of the data required to prepare a cost-effectiveness analysis. Specifically, ComEd provided estimates of incremental participation and program costs, including costs of switches and incentives, associated with an expansion of the Nature First program. ICF simply processed these data such that the TRC test could be calculated.

Q. What were the results of the cost-effectiveness analysis of the demand response program?

A. The proposed expansion of the Nature First program passed the TRC test with an estimated benefit-cost ratio of 1.05.

Q. Did you also analyze the cost-effectiveness of the programs proposed by DCEO?

A. Yes. With the exception of the low-income programs, each program was cost-effective. These results are set forth in Table 4 above. DCEO provided all program data required for the cost-effectiveness analysis. We processed these data such that the program cost-effectiveness could be calculated using the same process as was used for ComEd's programs. Although we discussed certain assumptions with DCEO, we did not assist with program design or data collection.

Q. Did you also test the cost-effectiveness of the portfolio as a whole?

A. Yes. The portfolio as a whole, including both the ComEd and DCEO programs, has an estimated TRC test benefit-cost ratio of 1.43.

III. <u>Energy Efficiency Portfolio's Ability to Achieve Statutory Goals</u>

Q. In your opinion, is ComEd's energy efficiency portfolio, in conjunction with DCEO's portfolio, designed to achieve the savings goals in Section 12-103(b) of the Act?

A. Yes. The explicit objective of the analysis process was to design a portfolio that would meet the savings goals, and the portfolio proposed by ComEd inclusive of the DCEO programs does meet the savings goals. However, we recognize that there are a number of uncertainties that characterize the analysis. For example, if the values that we have used to represent energy efficiency measure savings are incorrect, if program participation is not what we estimate, or if the NTG ratios chosen by the independent evaluator vary from those that we have used in our analysis, the verified net savings estimated by the evaluator could be different than our estimate.

Because of this uncertainty, we performed a risk analysis of the portfolio. The statute prescribes both hard energy efficiency savings goals and penalties for failing to meet those goals. ComEd therefore requires a portfolio that is sufficiently robust and flexible that it can meet its goals even if one or more programs do not deliver as expected. To determine how to create this robustness, we needed to examine how overall portfolio performance would be affected by program- and measure-specific performance that did not match expectations. In addition, identifying key portfolio uncertainties allows ComEd to target its efforts going forward more efficiently by focusing on improving the design of the programs that contribute the most to portfolio risk, and by designing away from the risk; that is, focusing on those programs for which we have greater confidence in key assumptions. There always will be a trade-off, however, between minimizing risk and minimizing cost. As is often the case, the least expensive options often carry the greatest risk. Thus, designing away from the risk very often imposes a cost on the portfolio.

The risk analysis involves establishing probability distributions around the four variables in the portfolio that represent program performance. These variables include: (1) measure energy savings, (2) projected measure installations, (3) NTG ratios and (4) the engineering verification factor. Measure energy savings is the difference in annual energy consumption between the baseline and efficient technologies. Projected measure installations is the count of measures the program expects to install. The NTG ratio in the model is defined as [(one minus the free-ridership rate) plus the spillover rate], where the free-ridership rate is the percentage of program participants that would have installed the measure in the absence of the program, and spillover is the fraction of program savings attributable to customers who were influenced by, but did not formally participate in, a program. The engineering verification factor is the ratio of evaluated verified installations to gross tracking installations. The estimated energy use reduction for a measure is the product of these four variables.

We set probability distributions around each of these four variables for each program, and ran a Monte Carlo simulation of the portfolio to see what effect these uncertainties would have given the structure of the portfolio. A Monte Carlo simulation is actually a large number of portfolio simulations, each of which includes different values of the variables around which distributions were set. The results allow us to calculate the probability that the portfolio will meet its target given program performance uncertainty and to identify the uncertainties that contribute the most to portfolio risk.

Q. Please describe the results of the Monte Carlo analysis.

A. The results of this simulation showed that uncertainties contributing the greatest amount to portfolio risk are the NTG ratios for CFLs in the residential and commercial sectors. However, this is not surprising for several reasons. First, CFLs constitute a large portion of kilowatthour ("kWh") savings in ComEd's portfolio, as they do in many portfolios around the country. Second, it is very difficult to predict the value that an evaluator will assign to the program NTG ratio based on *ex post* analysis. Using NTG ratios from similar programs around the country is a reasonable approach and one that is consistently used. Presumably, the independent evaluators will estimate NTG ratios for ComEd's programs, although given the low evaluation budget and the high cost of developing NTG ratio estimates, it is unclear if the evaluator will develop such program-specific estimates or not. There is a correlation between the precision of NTG ratios and the evaluation budget – less precision means more uncertainty.

Q. Does the risk you have described materially affect whether ComEd's Plan is designed to meet the statutory goals?

A. No. Although CFL NTG ratio uncertainty contributes the most to ComEd's portfolio risk of all of the variables examined in the risk analysis, this particular risk can be mitigated. Under any reasonable set of circumstances, ComEd must be able to realize substantial energy savings from the CFLs incented through its programs if it is to achieve its savings goals, as there are no other measures that can reach significant market share so rapidly and inexpensively. However, ComEd has three options for managing the risk. The first is to ensure that programs that include CFLs are appropriately designed to reduce the likelihood of free-ridership. ComEd has done this by emphasizing designs that require participants to pay some fraction of the cost of the bulbs or take some affirmative action to receive the bulbs. Second, ComEd can plan to move a greater number of CFLs through its program than it otherwise would, such that the net savings from the CFLs (after accounting for the NTG ratio) are sufficient to enable ComEd to meet its targets. ComEd has done this, although the number of CFLs envisioned by the Plan remains well within the range of what other utilities have accomplished. Finally, ComEd can accelerate (as much as is prudent) the introduction of other programs and measures that are not as susceptible to the NTG ratio uncertainty. ComEd has done this by planning to accelerate the level of activity under its proposed Custom Incentive program element. In addition to these three options, assurance that the independent evaluator will calculate the NTG ratio as defined above, that is, including both free-ridership and spillover, substantially reduces risk since those two factors tend to offset one another.

Q. How would you recommend that ComEd address its risk going forward?

A. As stated above, because Section 12-103 of the Act mandates clear annual energy efficiency savings goals, combined with penalties for failing to meet those goals, ComEd must retain the ability to adjust its portfolio and program design based on the real-time information it receives regarding program performance. Specifically, as described in the direct testimony of Mr. Brandt (ComEd Ex. 2.0), ComEd must be able to reallocate funds across program elements and modify, discontinue and add program elements within approved programs based on actual implementation experience and the results of the evaluation of its programs.

IV. The Use of Deemed Values for Certain Variables

Q. Please define the term "deemed values" as it is sometimes used in the context of energy efficiency analysis.

A. "Deemed values" means simply that the values of certain variables used in an analysis of program impact have been agreed to by parties or set by a public utilities commission. Put another way, to "deem" a value means that parties have agreed, or a commission has found, that there is sufficient existing information regarding the value of a variable that the value can be accepted as the basis for both planning purposes and evaluation.

Q. Are you recommending that any values used in your analysis be deemed?

A. Yes. I recommend that the Commission, by accepting the values used in our analysis, deem certain measure savings and NTG ratio values for the implementation and evaluation of the programs. These values would then be used by the independent evaluator when calculating the actual savings associated with certain programs.

Q. Why is it appropriate to deem certain values for purposes of evaluation in this proceeding?

A. There are a couple of reasons. <u>First,</u> in Illinois, Section 12-103(f) of the Act limits the budget that can be allocated to evaluation of utilities' energy efficiency and demand response measures to 3% of portfolio resources. This budget is very small by current standards in the industry, and is in fact one of the lowest allocations that I have seen. For example, the California utilities that will constitute ComEd's peer group will be spending closer to 8% of their total budgets on evaluation. This low allocation effectively means that an evaluator will not be able to conduct the level of analysis required to independently determine the savings values for the over 1,000 measures included in the

ComEd programs as well as calculate NTG ratios for all programs including both free-rider and spillover effects using ComEd program data.

Deeming savings is a common approach in the evaluation community given the substantial experience with the savings associated with basic non-weather-sensitive measures such as lighting. For example, large sums of money have been spent in California to independently determine deemed savings for measures, which values are then published in DEER. Some of the basic lighting measures in DEER are also included in ComEd's portfolio, and are therefore appropriate to deem for ComEd's portfolio. Indeed, if these values are not deemed, ComEd's evaluator will, with a very limited budget, be replicating well-established and widely relied upon savings research. In other words, the evaluator would be spending money verifying numbers that most of the evaluation community already accepts despite having less money available than other jurisdictions for such activities. And, spending evaluation money on deeming measure savings will mean the evaluator will have less money to spend on other critical evaluation activities, such as conducting new NTG ratio studies with the level of rigor needed to instill confidence in these estimates.

<u>Second</u>, the fact that there likely will not be sufficient resources to independently establish measure savings and NTG ratio values creates risk for ComEd that is difficult to mitigate or manage. While I believe that the values we have used for key variables are well-established and documented, there is no way to know how an as-yet unknown evaluator will choose to pursue the evaluation and what values the evaluator might come up with for these variables. Therefore, ComEd could do an outstanding job of designing and implementing programs, yet still have an evaluator find that it did not reach its

savings goals by virtue of having used a different value than the evaluator used for a certain key variable. Deeming certain values up front can provide much needed certainty to all parties.

Q. How do you propose the Commission use these values?

A. Because of the reasons outlined above, the Commission should deem the proposed measure savings and NTG ratio values for the initial, pre-evaluation period of ComEd's three-year Plan. If the independent evaluator later finds that one or more of the deemed values is inappropriate and provides evidence to support that assertion, the values certainly should be adjusted, but only prospectively. In particular, if the independent evaluator modifies values deemed by the Commission or otherwise establishes new values, those values only should be applied in subsequent Plan years and not to savings booked to that point or otherwise booked in the current Plan year. Retroactive application of new values would introduce additional uncertainty and risk to the process.

Q. What measure values do you recommend the Commission deem?

A. I recommend the deemed savings values in Table 6 below for measures in the residential and small retail markets. These are basic lighting measures critical to the portfolio's success. This list really includes only five technologies, with variations on wattage and target market for CFLs, and variations on wattage and length for T8s. These basic technologies include: (1) Integral CFL; (2) Modular CFL; (3) Super T8 lamps with electronic ballast; (4) T8 32 lamps with electronic ballast; and (5) T8 lamps with electronic ballast and reflector.

Table 6: Proposed Deemed Annual kWh Savings Values

Target market	Base Technology	Efficient Technology	Efficient Technology Definition	Annual kWh savings
All Residential	40W Incandescent	13 Watt Integral CFL	13 Watt < 800 Lumens - screw-in	23.1
All Residential	60W Incandescent	13 Watt Integral CFL	13 Watt >= 800 Lumens - screw-in	40.1
All Residential	60W Incandescent	14 Watt Integral CFL	14 Watt - screw-in	39.3
All Residential	60W Incandescent	15 Watt Integral CFL	15 Watt - screw-in	38.4
All Residential	60W Incandescent	16 Watt Integral CFL	16 Watt - screw-in	37.6
All Residential	60W Incandescent	18 Watt Integral CFL	18 Watt < 1,100 Lumens - screw-in	35.9
All Residential	75W Incandescent	18 Watt Integral CFL	18 Watt >= 1,100 Lumens - screw-in	48.7
All Residential	75W Incandescent	19 Watt Integral CFL	19 Watt >= 1,100 Lumens - screw-in	47.8
All Residential	75W Incandescent	20 Watt Integral CFL	20 Watt - screw-in	47.0
All Residential	100W Incandescent	23 Watt Integral CFL	23 Watt - screw-in	65.8
All Residential	75W Incandescent	25 Watt Integral CFL	25 Watt < 1,600 Lumens - screw-in	42.7
All Residential	100W Incandescent	25 Watt Integral CFL	25 Watt >= 1,600 Lumens - screw-in	64.1
All Residential	75W Incandescent	26 Watt Integral CFL	26 Watt < 1,600 Lumens - screw-in	41.9
All Residential	100W Incandescent	26 Watt Integral CFL	26 Watt >= 1,600 Lumens - screw-in	63.2
All Residential	100W Incandescent	28 Watt Integral CFL	28 Watt - screw-in	61.5
All Residential	100W Incandescent	30 Watt Integral CFL	30 Watt - screw-in	59.8
All Residential	150W Incandescent	36 Watt Integral CFL	36 Watt - screw-in	97.4
All Residential	150W Incandescent	40 Watt Integral CFL	40 Watt - screw-in	94.0
Multi-family	75W Incandescent	18 Watt Integral CFL	18 Watt >= 1,100 Lumens - screw-in	48.7
Retail - Small	2 4' T12 34 watt lamps with magnetic ballast	1 4' T8 32 watt lamps with electronic ballast & reflector	1 4' T8 32 watt lamps	156.2
Retail - Small	2 8' T12 60 watt lamps with magnetic ballast	1 8' T8 59 watt lamps with electronic ballast & reflector	1 8' T8 59 watt lamps	220.2
Retail - Small	40W Incandescent	13 Watt Modular CFL	13 Watt < 800 Lumens - pin based	100.5
Retail - Small	40W Incandescent	13 Watt Integral CFL	13 Watt < 800 Lumens - screw-in	100.5
Retail - Small	60W Incandescent	13 Watt Modular CFL	13 Watt >= 800 Lumens - pin based	175.0
Retail - Small	60W Incandescent	13 Watt Integral CFL	13 Watt >= 800 Lumens - screw-in	175.0
Retail - Small	60W Incandescent	14 Watt Modular CFL	14 Watt - pin based	171.3
Retail - Small	60W Incandescent	14 Watt Integral CFL	14 Watt - screw-in	171.3
Retail - Small	60W Incandescent	15 Watt Modular CFL	15 Watt - pin based	167.6
Retail - Small	60W Incandescent	15 Watt Integral CFL	15 Watt - screw-in	167.6
Retail - Small	60W Incandescent	16 Watt Modular CFL	16 Watt - pin based	163.9
Retail - Small	60W Incandescent	16 Watt Integral CFL	16 Watt - screw-in	163.9
Retail - Small	60W Incandescent	18 Watt Modular CFL	18 Watt < 1,100 Lumens - pin based	156.4
Retail - Small	60W Incandescent	18 Watt Integral CFL	18 Watt < 1,100 Lumens - screw-in	156.4
Retail - Small	75W Incandescent	18 Watt Modular CFL	18 Watt >= 1,100 Lumens - pin based	212.3
Retail - Small	75W Incandescent	18 Watt Integral CFL	18 Watt >= 1,100 Lumens - screw-in	212.3
Retail - Small	75W Incandescent	19 Watt Modular CFL	19 Watt >= 1,100 Lumens - pin based	208.5
Retail - Small	75W Incandescent	19 Watt Integral CFL	19 Watt >= 1,100 Lumens - screw-in	208.5
Retail - Small	2 4' T12 34 watt lamps with magnetic ballast	2 4' Super T8 28 watt lamps with electronic ballast	2 4' Super T8 28 watt lamps	96.1

Target market	Base Technology	Efficient Technology	Efficient Technology Definition	Annual kWh savings
Retail - Small	2 4' T12 34 watt lamps with magnetic ballast	2 4' T8 32 watt lamps with electronic ballast	2 4' T8 32 watt lamps	56.1
Retail - Small	2 8' T12 60 watt lamps with magnetic ballast	2 8' Super T8 59 watt lamps with electronic ballast	2 8' Super T8 59 watt lamps	100.1
Retail - Small	2 8' T12 60 watt lamps with magnetic ballast	2 8' T8 59 watt lamps with electronic ballast	2 8' T8 59 watt lamps	56.1
Retail - Small	75W Incandescent	20 Watt Modular CFL	20 Watt - pin based	204.8
Retail - Small	75W Incandescent	20 Watt Integral CFL	20 Watt - screw-in	204.8
Retail - Small	100W Incandescent	23 Watt Modular CFL	23 Watt - pin based	286.7
Retail - Small	100W Incandescent	23 Watt Integral CFL	23 Watt - screw-in	286.7
Retail - Small	75W Incandescent	25 Watt Modular CFL	25 Watt <1,600 Lumens - pin based	186.2
Retail - Small	75W Incandescent	25 Watt Integral CFL	25 Watt <1,600 Lumens - screw-in	186.2
Retail - Small	100W Incandescent	25 Watt Modular CFL	25 Watt >= 1,600 Lumens - pin based	279.3
Retail - Small	100W Incandescent	25 Watt Integral CFL	25 Watt >= 1,600 Lumens - screw-in	279.3
Retail - Small	75W Incandescent	26 Watt Modular CFL	26 Watt <1,600 Lumens - pin based	182.5
Retail - Small	75W Incandescent	26 Watt Integral CFL	26 Watt <1,600 Lumens - screw-in	182.5
Retail - Small	100W Incandescent	26 Watt Modular CFL	26 Watt >= 1,600 Lumens - pin based	275.6
Retail - Small	100W Incandescent	26 Watt Integral CFL	26 Watt >= 1,600 Lumens - screw-in	275.6
Retail - Small	100W Incandescent	28 Watt Modular CFL	28 Watt - pin based	268.1
Retail - Small	100W Incandescent	28 Watt Integral CFL	28 Watt - screw-in	268.1
Retail - Small	120W Incandescent	30 Watt Modular CFL	30 Watt - pin based	335.2
Retail - Small	100W Incandescent	30 Watt Integral CFL	30 Watt - screw-in	260.7
Retail - Small	150W Incandescent	36 Watt Integral CFL	36 Watt - screw-in	424.5
Retail - Small	120W Incandescent	40 Watt Modular CFL	40 Watt - pin based	297.9
Retail - Small	150W Incandescent	40 Watt Integral CFL	40 Watt - screw-in	409.6
Retail - Small	200W Incandescent	55 Watt Modular CFL	55 Watt - pin based	540.0
Retail - Small	200W Incandescent	65 Watt Modular CFL	65 Watt - pin based	502.7

The savings values above are based on a simple calculation that multiples the difference in wattage between the assumed base technology and the efficient technology and the number of hours of operation. The operating hours used in the calculation are shown in Table 7.

Table 7: Operating Hours

Sector	Technology	Subsector	Annual Operating Hours
Non-residential	CFL Lighting	Retail - Small	3,724
Non-residential	Non-CFL Lighting	Retail - Small	4,004
Residential	CFL Lighting	Residential	854

Q. What NTG ratio values do you proposed the Commission deem?

A. I recommend that the Commission deem the NTG ratio values set forth in Table 8 below. I want to emphasize, however, that the NTG ratios presented below are taken from several California sources. Although the current standard procedure in California is to define NTG ratios only in terms of free-ridership levels, I am recommending that the NTG ratio be defined more appropriately as the sum of free rider and spillover effects. In fact, as noted in the direct testimony of Mr. Hall (ComEd Ex. 7.0), California policy makers and evaluators currently are exploring changes to their standard process to incorporate spillover effects where possible in their NTG ratio estimates. As I explained earlier, the effect of including spillover effects in NTG ratio calculations is to raise the ratio – spillover represents savings attributable to the program for which the program did not have to pay. Therefore, the values that I propose the Commission deem are in fact conservative estimates of NTG ratios in that they reflect primarily only free-rider effects. NTG ratios that incorporate both free riders and spillover would be higher than those I have proposed.

Table 8: Proposed Deemed Net-to-Gross (NTG) Ratio Values

Program	Net-to-Gross Ratio	Source
Single Family Home Performance	0.8	CA Energy Efficiency Policy Manual
Residential AC Tuneup	0.8	CA Energy Efficiency Policy Manual
Recycled refrigerator	0.35	DEER
Recycled freezer	0.54	DEER
Residential Lighting	0.8	CA Energy Efficiency Policy Manual
Residential Multifamily "All Electric" Sweep	0.8	CA Energy Efficiency Policy Manual
Residential Appliances	0.8	CA Energy Efficiency Policy Manual
Residential New HVAC	0.8	CA Energy Efficiency Policy Manual
Residential Advanced Lighting	0.8	CA Energy Efficiency Policy Manual
Nature First Expansion	N/A	N/A
C&I Prescriptive	0.8	CA Energy Efficiency Policy Manual
C&I Retrocommissioning	0.8	CA Energy Efficiency Policy Manual
Small C&I CFL Intro Kit	0.8	CA Energy Efficiency Policy Manual
C&I Custom	0.8	CA Energy Efficiency Policy Manual
C&I New Construction	0.8	CA Energy Efficiency Policy Manual
DCEO Public Sector Prescriptive	0.8	CA Energy Efficiency Policy Manual
DCEO Public Sector Customized Program	0.8	CA Energy Efficiency Policy Manual
DCEO Public Retrocommissioning	0.8	CA Energy Efficiency Policy Manual
DCEO Lights for Learning	0.8	CA Energy Efficiency Policy Manual
DCEO Low Income New Const. Gut Rehab	0.8	CA Energy Efficiency Policy Manual
DCEO Low Income EE Moderate Rehab (MF)	0.8	CA Energy Efficiency Policy Manual
DCEO Single Family Rehab	0.8	CA Energy Efficiency Policy Manual
DCEO Low Income Direct Install	0.8	CA Energy Efficiency Policy Manual
DCEO Smart Energy Design Assistance Program	0.8	CA Energy Efficiency Policy Manual
DCEO Manufacturing Energy Efficiency Program	0.8	CA Energy Efficiency Policy Manual
DCEO Building Industry Training & Education	0.8	CA Energy Efficiency Policy Manual
DCEO Public Sector New Construction	0.8	CA Energy Efficiency Policy Manual

Q. What are the sources of the proposed measure savings and NTG ratio values?

A. The source of energy savings and operating hours values is DEER, which has been designated by the CPUC as its source for deemed and impact costs for program planning.

The primary source of NTG ratios is the California Energy Efficiency Policy Manual, which suggests a default NTG ratio of 0.8 for all proposed programs, with the exception of refrigerator and freezer recycling programs.

V. <u>Compliance With Spending Screens</u>

Q. Does the portfolio that ComEd has proposed in its Plan comply with the spending screens described in Section 12-103(d) of the Act?

A. Yes. ComEd provided ICF with its estimates of the spending screen calculations for each year of the Plan. The sum of the costs that we have estimated for ComEd's programs, the costs that the Department estimates for its programs, and portfolio-wide costs for portfolio administration, evaluation, and information, awareness and education programs is less than the spending screen for each year of the Plan.

VI. <u>Diversity of ComEd's Energy Efficiency and Demand Response Plan</u>

Q. Please describe the diversity of the programs in ComEd's Plan.

A. First, ComEd's Plan includes both the portfolio of programs developed by ComEd itself as well as the portfolio of programs developed by DCEO. The portfolio of programs developed by DCEO has been integrated fully into ComEd's Plan and contributes significantly to diversity. Further, the programs included in ComEd's portfolio also serve diverse classes of end users. Within the Residential Solutions program, the program elements address residential lighting, second refrigerators, new central and room air conditioners, air infiltration, central air conditioner charge and airflow, common area lighting in multi-family buildings, and advanced lighting packages in new homes. Within the Business Solutions program, the program elements incorporate measures addressing lighting, motors, air conditioning, building operations, commercial food service equipment, office equipment and ventilation. The wide diversity of industrial end use and measures is addressed by the Custom Incentive program element, which is designed to include all measures that can be found on a project basis to be cost-effective. The programs within ComEd's portfolio are designed to evolve, and incorporate additional measures over time. In addition, the programs are diverse across sectors and market segments. The programs address residential customers living in existing single family and multi-family homes, as well as low-income customers through programs offered by the Department for customers in existing renovated and new homes. ComEd's portfolio also includes programs targeted at residential and commercial new construction. The programs also address commercial, industrial, institutional and governmental customers. Small commercial customers are targeted through the Small Commercial CFL Intro Kit program element.

Q. Please describe the various customers for which energy efficiency and demand response programs are made available.

A. As I explain above, the portfolio has wide coverage of sectors and market segments. Programs are designed for low-income residential customers, municipal customers, large and small commercial customers, renters, homeowners, industrial facilities, and existing and new construction markets.

Q. Does this conclude your direct testimony?

A. Yes.

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EDUCATION

M.A. Public Affairs (Energy Policy and Quantitative Methods), Humphrey Institute, University of Minnesota, Minneapolis, Minnesota, 1981

B.A., Summa cum Laude, Phi Beta Kappa, Political Science, Hamline University, St. Paul, Minnesota, 1978

EXPERIENCE OVERVIEW

Mr. Jensen, a Senior Vice President with ICF, Manages the firm's San Francisco office. He has over 25 years of experience with utility resource planning, energy efficiency and renewable energy program, design, utility restructuring, and market transformation for local, state and federal agencies, and electric and gas utilities. Mr. Jensen managed Illinois' statewide electric and natural gas integrated resource planning program, directing all technical and economic analyses, and providing testimony before the Illinois Commerce Commission. He has advised major electric and natural gas utilities on the development of energy efficiency programs and resource plans, and worked with the U.S. Environmental Protection Agency on the analysis of a variety of energy efficiency technologies and potential markets. For the U.S. Department of Energy, he managed the Competitive Resource Strategies Program, and coordinated utility restructuring-related research and policy for the Office of Energy Efficiency and Renewable Energy. He also served as a senior member of the staff of the Assistant Secretary for Energy Efficiency, and managed the Department of Energy's Chicago Regional Office. Recent projects have included management of energy efficiency potential studies in Wisconsin, Ontario, and Georgia, development of DSM plans for utilities in Illinois, Wisconsin and Missouri, preparation of multiple DSM program filings for a Nevada utility, an assessment of potential utility DSM business and regulatory models, and development and management of a number of energy efficiency programs.

PROJECT EXPERIENCE

Strategy and Regulatory Support

<u>Support for California's Energy Efficiency Strategic Planning Process</u>
In October 2007 the California Public Utility Commission (CPUC) initiated a statewide energy efficiency strategic planning process focused on investor-owned utility pursuit of several "Big Bold" strategies. Mr. Jensen was asked to provide support to the CPUC in the overall coordination of the process, and to lead investigation of strategies for integrating energy efficiency, demand-response and renewable energy technologies.

<u>Development of a New Business Strategy for an Electricity Retailer</u>

Mr. Jensen designed and led an assessment of potential new business opportunities for an unregulated electricity retailer interested in expanding its demand-side market presence. Over two dozen potential business opportunities were investigated and detailed business cases were prepared for five specific opportunities.

Utility Energy Efficiency Benchmarking
For E.ON (Louisville Gas & Electric and Kentucky Utilities) Mr. Jensen led an assessment of the utility's existing DSM portfolio using ICF's energy efficiency portfolio development framework. The team reviewed the structure and performance of the existing portfolio and developed a set of benchmark programs meeting the Company's portfolio objectives.

Development of DSM Planning Process
For a major utility in Missouri, Mr. Jensen is leading a team to develop a DSM planning process within an IRP framework. The engagement also entails development of DSM portfolios for inclusion in the IRP and facilitation of a stakeholder workshop process.

Strategic Support for DSM Portfolio Development
Mr. Jensen is providing strategy support senior executives at a major Midwestern utility for the development of a demand-side portfolio for implementation within a restructured environment. Support includes portfolio review, regulatory strategy, and assistance with design of an administrative/business structure.

Assessment of Energy Efficiency Business Models
Mr. Jensen led a project for a major Midwestern utility to identify and assess a range of potential business and regulatory models for administration of energy efficiency programs. The client was interested in exploring the role of energy efficiency in a post-restructuring market in several states. ICF developed six potential models and assessed the viability of the models relative to regulatory policy, company risks and benefits, benefits to customers and likely stakeholder reaction.

Residential Energy Service Offering
For Unicom, Mr. Jensen led a team to assess a unique residential energy service offering that would have provided energy service at a fixed monthly charge. Under this model, the unregulated provider would have provided energy, and energy efficiency services including demand response technology. In return for agreement allowing the provider the provide energy management services, the customer would be charged a fixed monthly fee. ICF provided detailed building energy simulations for the Chicago market and assessed the risks associated with the product, including demand and weather risk. Ultimately, the lack of a liquid market for weather hedges at the time made the project infeasible.

Development of a Gas DSM Portfolio
As a response to expected skyrocketing natural gas costs over the winter of 2005-06, a Midwestern utility requested that ICF develop a quick-start natural gas DSM portfolio. Mr. Jensen's team was given approximately three weeks to prepare basic programs designs for five programs, including preliminary estimates of market penetration and program savings. The $6 million portfolio was approved by the State's regulatory commission and launched in December 2005.

Development of a Green Power Business Plan
Mr. Jensen worked as part of a team to develop a business plan for a utility affiliates planned entry into the green power products market. Tasks included development of a consumer acquisition strategy and a marketing plan.

Development of Utility Energy Efficiency Plan
Mr. Jensen led an ICF Consulting team in the development of a plan for a major utility's re-entry the energy efficiency program administration. The assignment involves a baseline market

characterization, development of a portfolio framework, preparation of program templates for the $60 million initiative, and preparation of a program management plan.

<u>DSM Program filings</u>
For Nevada Power and Sierra Pacific Resources, Mr. Jensen led an ICF team in the preparation of several regulatory filings to support DSM program implementation. This project included a review of individual program designs, assessment of the portfolio structure, and drafting the filings and supporting testimony.

<u>Renewable Energy Portfolio Standard Compliance Plan</u>
Mr. Jensen led preparation of a compliance plan for Nevada Power's compliance with Nevada's aggressive renewable portfolio standard that was filed with the Nevada Commission in December 2005. The plan addressed the Company's current and expected portfolio position, reviewed a wide range of internal and external factors affecting compliance and developed a series of strategies and actions for bring the Company into compliance. The project involved extensive collaboration with a number of organizations within the Company.

<u>Wind Energy Solicitation</u>
Mr. Jensen is leading an ICF team in the development of an RFP to acquire wind resources for a major Midwestern utility. In addition, ICF is being retained as the independent bid manager responsible for review of the bids received under the solicitation.

<u>Gas DSM Testimony in Illinois</u>
Mr. Jensen provided expert testimony in a natural gas rate proceeding regarding proposals for Nicor to develop and fund natural gas energy efficiency programs.

<u>Estimates of Energy Efficiency Potential in Wisconsin</u>
The State of Wisconsin requires utilities seeking to construct new generation to demonstrate that they have first considered all economic opportunities for energy efficiency to reduce the need for new capacity. In support of two utilities' proposals for new generating capacity, Mr. Jensen developed testimony pertaining to the amount of energy efficiency potential that could be expected in the utilities' service territories.

<u>Energy Efficiency Potential in Georgia</u>
Mr. Jensen led the development of estimates of energy efficiency potential for the State of Georgia. Using a detailed end use model developed by ICF for measuring energy efficiency potential, the team prepared estimates of electric and gas efficiency potential, estimating rate impacts that would be associated with adoption of energy efficiency programs, and assessing the ancillary economic and environmental impacts associated with energy efficiency acquisition.

<u>Energy Efficiency Potential in Ontario</u>
Mr. Jensen led a team that developed estimates of energy efficiency potential for the Ontario Power Authority. This project also involved application of a formal analysis of the uncertainties associated with potential estimates using Monte Carlo simulation.

<u>Evaluation of the Energy Innovations Small Grants Program</u>
Mr. Jensen served on a three-person senior review team to assess the operation and results of a program designed to provide first-stage R&D funding to small business and individuals. The team developed a framework for evaluating value-creation and value-capture in a program managed by the California Energy Commission to fund promising energy system R&D.

<u>Illinois' Integrated Resource Planning Process</u>
In the mid-1980s, Illinois enacted one of the country's most comprehensive integrated resource planning processes. Mr. Jensen organized and led a statewide collaborative responsible for developing administrative rules for implementation of the process. He led the team responsible for filing the first statewide electric and natural gas integrated plans, and was lead witness for the

State agency responsible for the plans. He also filed testimony reviewing the integrated plans filed by Commonwealth Edison.

Florida Integrated Resource Planning
While with the US Department of Energy, Mr. Jensen drafted testimony on behalf of the Department with respect to IRP rules under consideration by the Florida PSC, and provided lead case support.

Energy Efficiency Program and Technology Analysis and Implementation

Design and Implementation of Small Commercial Energy Efficiency Program
For the City of San Francisco, Mr. Jensen led a team in the design and implementation of a program providing rebates for installation of energy efficiency measures under the City's Energy Watch Program, funded by PG&E. The team designed the program structure, all policies and procedures and provided implementation support including project verification and rebate processing.

Development and Implementation of a Consumer Rebate Program
Mr. Jensen led an ICF team in the development and implementation of program providing gift cards to consumers purchasing qualifying residential products. The ICF team was given less than two months to design the program, develop all collateral material, recruit participating retailers, organize retailer events and incentive fulfillment and launch the program.

Implementation Support for an Energy Efficiency Procurement Plan
Mr. Jensen is leading an ICF team in providing full-scale implementation support for a large Midwestern utility's energy efficiency portfolio. ICF is developing final program designs, drafting requests for proposals for implementation and evaluation contractors, helping to establish a program management "back office", and monitoring implementation progress.

Evaluation of the Statewide Appliance Early Retirement and Recycling Program
Mr. Jensen directed an impact evaluation of a recent statewide appliance retirement and recycling program. The evaluation included a meta-analysis of prior evaluation studies and analysis of on-site monitoring data.

Partnership for Energy Affordability in Multi-Family Housing
Mr. Jensen designed and is directing implementation of a $1.8 million program to deliver comprehensive energy efficiency services to multi-family affordable housing in Northern California. The program was recently selected by the California Public Utilities Commission for a two-year, $3 million extension.

Public Interest Energy Research Program – California Energy Commission
Mr. Jensen manages a team of 15 consulting firms providing technical assistance to the California Energy Commission in support of its PIER Program. Mr. Jensen is responsible for managing assignment of work authorizations, developing work plans, managing work performed and reporting to the CEC under this $3 million contract.

Walnut Creek Energy Strategy – City of Walnut Creek, CA.
Mr. Jensen was responsible for managing a project to evaluate energy efficiency and distributed generation opportunities for the City of Walnut Creek. Under this project, ICF Consulting, surveyed over 15 municipal facilities and prepared analyses of the const-effectiveness of a wide range of energy efficiency and renewable energy applications. The analysis identified several hundred dollars of cost-effective energy saving opportunities.

Residential HVAC Blitz – Pacific Gas & Electric
Mr. Jensen managed a project designed to encourage replacement of close to 1 MW worth of residential central air conditioning load in California's Central Valley within a 5-month window. ICF Consulting combined an innovative dealer up-selling training program with distributor and dealer incentives and exceeded its program goals. At the same time, dealers were left with a valuable set of selling techniques that are being used to continue to sell high efficiency systems even without financial incentives.

The Feasibility of Community Energy Cooperatives – State of Illinois
With ICF Consulting as a subcontractor to the University of Illinois, Mr. Jensen designed and coordinated an analysis of the feasibility of community energy cooperatives as aggregators and providers of energy efficiency services. The analysis also examined the impacts of coop-sponsored distributed resources on the distribution loads of the local utility.

Cost-Effectiveness Analysis of Advanced Residential Space Conditioning Systems – US EPA
Mr. Jensen directed an assessment of the costs and benefits of adopting advanced residential space conditioning systems for U.S. EPA. As part of that analysis, Mr. Jensen developed a method for estimating the market potential for the technologies.

Fuel Substitution Analysis – Confidential Utility Client
Directed an analysis of the cost-effectiveness and market potential of residential and commercial fuel substitution measures and associated technologies for a utility client.

Demand-Side Management Potential – Confidential Utility Client
For a utility client, Mr. Jensen prepared an analysis of the technical, economic and achievable potential for demand-side management. The project involved collection of residential, commercial and industrial DSM technology data, the analysis of technology costs and benefits, and an estimate of market penetration.

Demand-Side Management Action Plan – Confidential Utility Client
Directed development of a comprehensive DSM action plan for a utility client, involving preparation of detailed program designs for specific residential, commercial and industrial sector technologies and identification of DSM technology needs.

Energy and Utility Resources Policy Analysis

Development of Estimates of Energy Efficiency Potential
For the past three years, Mr. Jensen has led a team in development of a complex model to estimate energy efficiency potential. The model is based on an end-use characterization of demand, and includes a comprehensive database of energy efficiency measures and an endogenous function for projecting the diffusion of energy efficiency measures. The model has been used for utilities or government organizations in Wisconsin, the Province of Ontario and the State of Georgia.

Understanding the Renewable Energy Technology Value-Chain – US DOE
Mr. Jensen managed an ICF Consulting-led analysis of how the technologies supported by DOE's Office of Power Technologies (OPT) moved from the lab to the marketplace, focusing on the key dynamics involved in the technology diffusion process. The analysis was prepared to support the OPT RD&D planning process.

Policy Plan for a Municipal Water Agency's Investment in Renewable Energy
Mr. Jensen led a team hired by East Bay Municipal Utility District, one of the largest water utilities in the country, to develop an investment strategy supporting renewable energy development for the District. The team developed a comprehensive list of investment options and structures, facilitated a stakeholder review process and developed a business case for preferred options.

The Economic Efficiency of Wholesale and Retail Competition – US DOE
Mr. Jensen developed a policy paper for review within the Department of Energy that examined the relative economic efficiency gains expected from wholesale power market competition. He also coordinated a broader review of the tradeoffs between wholesale and retail electricity market competition.

The Public Policy Framework for Public Benefits – US DOE
As Director of the Department of Energy's Competitive Resource Strategies Programs, Mr. Jensen developed and coordinated a major collaborative project implemented by Oak Ridge National Laboratory to identify and assess a variety of policy objectives to support continued funding for a variety of public benefits programs.

Illinois Statewide Electric and Gas Utility Resource Planning
As Manager of the Illinois Department of Energy and Natural Resources Strategic Planning Section, Mr. Jensen helped develop Illinois' resource planning process for electric and natural gas utilities during the 1980s. He was responsible for development of biennial statewide electric and gas resource plans and for presenting those plans before the Illinois Commerce Commission.

Utility Restructuring, Market Transformation and Public Benefits

Financing Energy Efficiency in Assisted Multi-Family Housing – US DOE
The lack of financing for energy efficiency investment in multi-family housing and the split-incentive are oft-cited barriers to transforming this market. While with the US Department of Energy, Mr. Jensen developed a partnership with a state housing development authority to bring private financing through performance contracting to a market that previously had been neglected. Mr. Jensen's team provided training and technical and marketing assistance to the housing development authority, reviewed performance contracts and helped validate contractor-estimated energy savings. The project succeeded in bringing private financing to the upgrade of close to 1000 units of assisted housing, and demonstrated the viability of performance contracting in the multi-family market.

Transforming the Market for Modular Housing – US DOE
Mr. Jensen's team at the Department of Energy's Chicago Regional Office worked with modular housing manufacturers, state energy officials, and local housing developers to pull together a project resulting in the first Energy Star modular house in the Midwest. The team also developed a handbook for local housing developers interested in installing efficient modular homes, and began building a coalition of developers with an eye toward volume purchases of Energy Star-compliant modular designs.

The Midwest Energy Efficiency Alliance
While with the Department of Energy, Mr. Jensen organized and funded a project to explore the viability of Midwest Market Transformation network aimed at facilitating and coordinating multi-party energy efficiency market transformation projects. Based on the success of this project, he worked with utilities, State Energy Offices, and non-profit organizations to create the Midwest Energy Efficiency Alliance (MEEA) in late 1999, and served as a founding board member.

Financing Energy Efficiency in a Restructured Utility Environment – US DOE
Mr. Jensen designed and managed a project to examine the financing options available to the residential and small commercial markets for energy efficiency investments. The study's conclusion was that, absent at least interim support through public benefits programs, efficiency investment by small customers was likely to languish, in part because the efficiency industry had yet to fully develop to serve small customers.

Lessons Learned Regarding Public benefits and Utility Restructuring – US DOE
While Director of DOE's Chicago Regional Office, Mr. Jensen organized and moderated a daylong session involving public benefits experts from around the country to examine the lessons learned in securing public benefits funding as part of the restructuring process. The workshop explored the policy rationale and policy objectives assigned to public benefits programs across the country.

The Feasibility of Small Customer Aggregation – US DOE
Mr. Jensen managed an analysis of the economics of aggregating small residential and commercial customers in response to restructuring. The analysis examined economics from the "buy" and "sell" sides for several scenarios including commodity-only, bundled commodity and energy service, and bundled electricity and gas, and green power commodity. The analysis strongly suggested that the high recruitment and administrative costs associated with aggregating small customers offered, at best, razor-thin margins on the sell side. It further suggested that for-profit aggregation was severely constrained by standard offer prices in many restructured states.

The Midwest Restructuring Summit: The Art of the Deal – US DOE
In 1998, Mr. Jensen, on behalf of the Department of Energy, organized the Midwest Restructuring Summit: The Art of the Deal. This two-day, invitation-only conference drew over 100 of the region's utility commissioners, legislators, utility executives, consumer groups, and energy office officials to Chicago to outline the pieces in the restructuring deal critical to the future of public benefits funding.

Energy Efficiency and Climate Change

Assessment of Climate Change Mitigation Methodologies – US EPA
For U.S. EPA, directed an assessment of a wide variety of models and methodologies for assessing climate change mitigation options, principally energy efficiency. Developed a methodology for developing countries to use in assessing mitigation options and organized an international seminar to review the methodology.

Analysis of Transformers for the Energy Star Program – US EPA
Led a project to analyze the potential energy and carbon savings associated with improved power transformer efficiency. Explored the economic, energy and environmental implications of a variety of possible Energy Star standards for transformers.

Energy Efficiency in China – US EPA
For the U.S. EPA, prepared a briefing paper on the institutional framework for energy efficiency in China, and the potential for that framework to support energy efficiency policies similar to those in the U.S.

SELECTED PUBLICATIONS AND PRESENTATIONS

"Cranking the Numbers: Using Tracking Systems to Strengthen Program Management", *Association of Energy Service Professionals Annual Conference*, January 31, 2007.

"Resource Diversity for Distribution Companies", short course delivered at "Camp NARUC", Institute of Public Utilities, August 2006.

Jensen, Val R, "Efficiency Plays Role of Adolescent in Future Electric Industry", *Natural Gas and Electricity*, May 2005.

"Energy Efficiency in the Future of Supply and Transmission: A Parable of Adolescence", *Presentation to the Institute of Public Utilities Regulatory Policy Conference*, Charleston, S.C., December 7, 2004.

Jensen, Val R, "Midwestern Renaissance: A Tale of Three States' Public Benefits Victories", *ACEEE Summer Study in Buildings*, August 2000.

"Restructuring and Public Benefits" *Presentation to the Wisconsin Governor's Energy Roundtable*, Appleton, WI, November 1999.

Alexander, Larry; Hornby, Richard; Morgan, Steve, and Jensen, Val, *"The Feasibility of Small Customer Aggregation", ACEEE Summer Study in Buildings*, August 1998.

"The Progress of Electric Utility Restructuring", *Presentation to the Ice Skating Institute Annual Meeting*, Las Vegas, May 1998.

"Does Gas Integrated Resource Planning Still Make Sense?", *Presentation to the Colorado Public Utilities Commission Natural Gas Seminar*, Denver, CO, May 1993.

"Electricity Restructuring and the Role of State Energy Offices", *Presentation to* the *National Association of State Energy Officials Annual Meeting*, Jackson, WY, October 1995.

"The Role of Renewable Energy in a Restructured World", *Presentation to the 2nd Annual NARUC Renewable Energy Conference*, Madison, WI, May 1995.

"DSM Financing in the U.S", *Presentation to the 1992 Natural Gas Industry Forum: Integrated Planning-The Contribution of Natural Gas*, Gaz Metropolitan and Canadian Gas Association, Montreal, October 1992.

Jensen,Val R.; Jensen Ken; Wolfe, Steven, Karagocev, Robert; and Deem, Jack, "An Assessment of Selected Advanced Residential Space Conditioning Systems", Report for the Environmental Protection Agency, Barakat & Chamberlin, March 1992.

Jensen, Val, Kleemann, Susan, et.al., *Illinois Statewide Electric Utility Plan: Optioning Resources for the Future 1992-2012*, Illinois Department of Energy and Natural Resources, January 1991.

Jensen, Val, "Building the Strategic Context for Least-Cost Planning: The Illinois Experience", *Public Utilities Fortnightly*, March 28, 1990.

Jensen, Val and Wagener, Gregory, "Reforming Regulatory Reform", *Public Utilities Fortnightly*, July 12, 1986.

EMPLOYMENT HISTORY

ICF Consulting	Senior Vice President	2005 -
ICF Consulting	Vice President	2000-2004
U.S. Department of Energy	Director of Chicago Regional Office	1996-1999
U.S. Department of Energy	Senior Management Analyst	1994-1996
ICF Consulting	Project Manager	1992-1994
Barakat & Chamberlin	Senior Associate	1991-1992
Illinois Department of Energy	Manager of Strategic Planning	1980-1991